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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,399	04/15/2004	Mu-Kyeng Jung	SEC.1127	5525

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EXAMINER

LE, THAO X

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/824,399

Applicant(s)

JUNG ET AL.

Examiner

Thao X. Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 26-41 is/are pending in the application.
- 4a) Of the above claim(s) 27-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/9/6.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of claims 26-32 in the reply filed on 02 May 2006 is acknowledged.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 26-28, 31 are rejected under 35 U.S.C. 102(b) as being anticipated by US 6497824 to Chen et al.

Regarding claim 26, Chen discloses a semiconductor device in fig. 1 comprising: a first insulating layer 50, col. 2 line 35, a first lower interconnection 40 (left portion), col. 2 line 33, and a second lower interconnection 40 (right portion) formed in the first insulating layer 50; a capping layer 52, col. 2 line 41, formed over the first insulating layer 50 and having first and second windows (where 62 is located) respectively exposing the first and second lower interconnections 40, and a first metal resistor 60, col. 2 line 60, extending along the capping layer 52 and contacting respective top surfaces of the first and second lower interconnections 40 through the respective first

and second windows; wherein the first metal resistor 60 is not contacted from above by any electrical contact or interconnection, fig. 1.

Regarding claim 27, Chen discloses the device of claim 26, wherein the first metal resistor is formed of a material selected from a group consisting of titanium, titanium nitride, tantalum, tantalum nitride, and tantalum silicon nitride, col. 3 line 61..

Regarding claim 28, Chen discloses the device of claim 27, wherein the first metal resistor has a thickness of about 30 Å to 1000 Å, col. 3 line 63.

Regarding claim 31, Chen discloses the device of claim 26, wherein the first metal resistor 60 has a linear shape, fig. 1.

4. Claims 26, 30 are rejected under 35 U.S.C. 102(b) as being anticipated by US 6272736 to Lee.

Regarding claim 26, Lee discloses a semiconductor device in fig. 3D comprising: a first insulating layer 301, col. 4 line 51, a first lower interconnection 302b (left portion), col. 4 line 52, and a second lower interconnection 302b (right portion) formed in the first insulating layer 301; a capping layer 304, col. 4 line 53, formed over the first insulating layer 301 and having first and second windows (where 308a is located) respectively exposing the first and second lower interconnections 302b, and a first metal resistor 308a, col. 5 line 3, extending along the capping layer 304 and contacting respective top surfaces of the first and second lower interconnections 302b through the respective first and second windows; wherein the first metal resistor 308a is not contacted from above by any electrical contact or interconnection, fig. 3d.

Regarding claim 30, Lee discloses the device of claim 26, wherein the first metal resistor 308a includes a series of undulations or bends, fig. 3D.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6497824 to Chen et al. in view of US 6534374 to Johnson et al.

Regarding claim 29, Chen does not disclose the semiconductor device wherein the capping layer is of a material selected from the group consisting of silicon nitride and silicon carbide.

However, Johnson discloses a semiconductor device in fig. 10 comprises a metal resistor layer TiN 32 has a thickness of about 30 to 1000 angstroms, col. 5 lines 58-65 and wherein the capping layer 30 is of a material selected from the group consisting of silicon nitride and silicon carbide, col. 5 lines 40-41. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the cap layer material teaching of Johnson with Zurcher's device, because such barrier dielectric or etch stop material is typical in the art and would have provided the same function for intended use, MPEP 2144.07.

8. Claims 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over US6272736 to Lee in view of US 6534374 to Johnson et al.

Regarding claim 32, Lee discloses the device of claim 26, further comprising: a third lower interconnection 302a, col. 4 line 52, formed in the first insulating layer 301.

But, Lee does not disclose a second insulating layer formed on the capping layer and the first metal resistor, an upper interconnection formed on the second insulating layer and connected to the third lower interconnection via a contact.

However, Johnson discloses a device in fig. 14 comprises a resistor 52 in contact with a first and second interconnection 24 in the first dielectric layer 20, a third interconnection 22/28 in the first insulating layer 20, and a second insulating layer 31 formed on the resistor 52, an upper interconnection 68/70 formed on the second insulating layer 31 and connected to the third lower interconnection via a contact. At the time the invention was made; it would have been obvious to one

of ordinary skill in the art to use the upper interconnection teaching of Johnson with Lee's device, because such interconnection is typical in the art for intended purpose.

### ***Response to Arguments***

9. Applicant's arguments with respect to claims 26-32 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

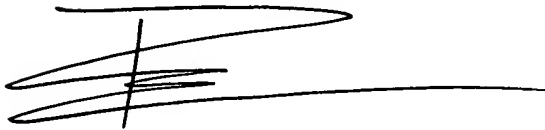
10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, consisting of a large, stylized 'T' followed by a horizontal line and some additional scribbles.

Thao X. Le  
04 June 2006